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IS *"SPIKE"* A RELIABLE FEATURE IN P_{orb} DISTRIBUTION OF *AM HER* STARS?

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Abstract. Orbital periods in AM Her stars (*polars*) are synchronized with spin periods of white dwarf by its high magnetic field. Since the last study of P_{orb} distribution of these systems, the number of known objects of such type has more than doubled. This challenged us to compile a new updated catalogue of cataclysmic variables with highly magnetic white dwarfs (polars) and to study their P_{orb} distribution. In this paper we also discus if "spike" is reliable feature in the distribution. ("Spike" is a concentration of polars in the distribution of their orbital periods near $P_{orb} = 114$ min and was previously discussed by Ritter & Kolb (1992) and Shahbaz & Wood (1996).)

1. Introduction

AM Her stars or Polars - is a subtype of cataclysmic variables, where binary stellar system contains highly magnetic white dwarf. The strength of magnetic field allows to control accretion in such system (mass is transferring directly on the white dwarf pole, without formation of accretion disc). As a distinct from intermediate polars, AM Her stars orbital period is synchronized with white dwarf spin period.

Last study of P_{orb} distribution were made by Shahbaz & Wood (1996) in 1996 (just 43 systems were known by that time). They have noted that discovery of one more AM Her-type star with the orbital period outside of the spike will decrease its significance below 99% level. Since that time the number of known systems has more then doubled. This incentivised us to compile a new updated catalogue of cataclysmic variables with highly magnetic white dwarfs and to study distribution of their orbital periods and to re-calculate significance of spike in the similar way, as it was done in previous work.

2. Results

Our Catalogue was compiled based on recently published papers on newly discovered polars and previous catalogues by Katysheva & Voloshina (2007)and Ritter & Kolb (2003). It contains an information about 91 polars (designation, coordinates, P_{orb}, masses of components (if known), strength of white dwarf magnetic field).

They have orbital periods ranging from 77 minutes to 286 minutes. We set period range for "spike" as 113-117 minutes. We obtained a grater statistic (91 systems in total) and were impelled to make the spike ranges some broader: $\Delta P_{spike} = 4$ min ($\Delta P_{spike} = 2$ min in Ritter & Kolb (1992), $\Delta P_{spike} = 3$ min in Shahbaz & Wood (1996)). Totaly, 11 AM Her-type stars have orbital periods "in spike".

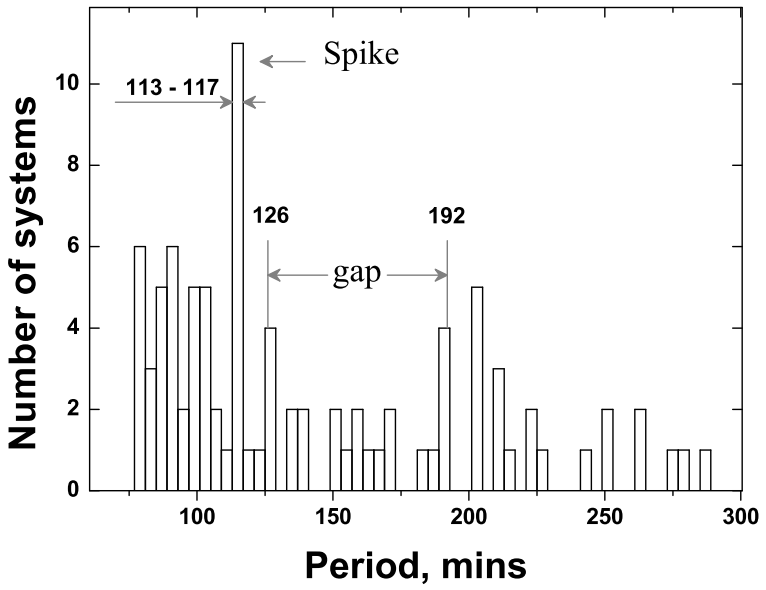

Figure 1. P_{orb} Distribution of AM Her Stars

Values of significances were obtained in the same way as in Shahbaz & Wood (1996). Spike still appears to be a significant feature in P_{orb} distribution of polars, although its significance now is equal to 99.6% (99.9% in previous work).

Figure 1 represents newly obtained distribution of orbital periods of highly magnetic cataclysmic variable stars. It could be concluded that about 55% of polars are concentrated below "period gap". Future study of polars with orbital periods in spike are critically important, since they might have very similar masses of components. Ritter & Kolb (1992) have shown, that dispersion of the secondary masses in the period spike must be $\delta M_2 \lesssim 2{\cdot}10^{-3} M_\odot$. Masses of white dwarf considered to be $M_1 \gtrsim 0.7 M_\odot$ with mass dispersion of $\delta M_1 \lesssim 0.05 M_\odot$

The full version of the Catalogue and detailed paper on our analysis will be published elsewhere.

3. Conclusion

- Most of known polars have orbital periods below "period gap" (50 of 91 known polars).
- We obtained a grater statistic (91 systems in total) and were impelled to make the spike ranges some broader: $\Delta P_{spike} = 4$ min ($\Delta P_{spike} = 2$ min in Ritter & Kolb (1992) - 17 polars in total were known, $\Delta P_{spike} = 3$ min in Shahbaz & Wood (1996) - 43 polars were known).
- Though spike remains to be significant feature, its significance has decreased and now its value is about 99.6%, instead of the 99.9%, as it was in the work of T.Shahbaz & Janet H.Wood (1996).
- The observed number of systems in the gap is inconsistent with the period distribution being uniform at the 96.3% level. So we have a lowering of this value, just like as for the spike significance.

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